

Kansas City PM Characterization Study

Final Report

Appendix GG

Round 1 Gravimetric vs Quartz Crystal Microbalance

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Sponsors:

National Renewable Energy Laboratory, U.S. Department of Energy
Federal Highway Administration, U.S. Department of Transportation
STAPPA-ALAPCO Emission Inventory Improvement Program
Coordinating Research Council Inc. (Project No. E-69)

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EPA Contract No. GS 10F-0036K

October 27, 2006
Revised April 2008 by EPA staff



United States
Environmental Protection
Agency

EPA420-R-08-009
April 2008

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Com	Bin No.	Assigned Bin	QC Code	Comment
84037	40.07	41.61	7.58	39.18	11.7	9.5	2.37	9.12	1	A.Truck-Pre 1981	VQ;2	
84154	83.98	59.69	37.57	59.44	163.2	80.5	15.2	80.3	1	A.Truck-Pre 1981		
Average	62.025	50.65	22.575	49.31	87.45	45	8.785	44.71				
Std. Dev.	31.04906	12.78449	21.20613	14.32598	107.1267	50.20458	9.07218	50.33186				
84048	236.6	9.68	50.14	24.21	239.36	47.14	89.03	59.98	2	B.Truck-1981-1990	FD;1	Stalled at start of Z1
84074	27.2	8.68	5.9	9.46	21.74	5.96	0.45	6.41	2	B.Truck-1981-1990		
84145	13.8	2.43	7.38	3.36	3.43	1.14	1.16	1.26	2	B.Truck-1981-1990		
84146	16.17	12.75	8.82	12.65	6.59	10.18	-2.15	9.16	2	B.Truck-1981-1990	VQ;2,4	
84189									2	B.Truck-1981-1990		
84201	42.64	20.87	28.06	22.51	28.19	1.01	147.53	12.49	2	B.Truck-1981-1990		
84216	5.45	18.84	-0.4	16.86	4.55	14.5	1.57	13.13	2	B.Truck-1981-1990	VQ;2	
84248	9.96	21.11	5.41	19.38	5.85	15.97	6.44	14.75	2	B.Truck-1981-1990		
84256	46.03	16.03	12.57	17.4	47.94	4.16	0.61	6.26	2	B.Truck-1981-1990		
84263									2	B.Truck-1981-1990	VQ;2	
84278	34.6	7.02	31.84	10.14	40.07	10.42	3.05	11.43	2	B.Truck-1981-1990		
84283									2	B.Truck-1981-1990		
84336	17.05	30.92	9.71	28.51	9.55	11.44	0.35	10.44	2	B.Truck-1981-1990	VQ;2	
84354	30.38	42.66	32.46	41.33	12.39	25.27	12.61	23.73	2	B.Truck-1981-1990		
84373	50.93	9.84	14.5	12.38	59.97	6.13	-3.35	8.37	2	B.Truck-1981-1990		
Average	44.23417	16.73583	17.19917	18.1825	39.96917	12.77667	21.44167	14.78417				
Std. Dev.	62.34937	11.24754	15.00945	10.11778	65.53638	12.80245	47.10206	15.25325				
84054	3.72	5.13	3.07	4.91	7.34	1.19	16.41	2.56	3	C.Truck-1991-1995		Tunnel heater off
84064	12.47	2.79	2.65	3.28	2.71	0.45	-0.75	0.48	3	C.Truck-1991-1995		
84066	8.31	8.97	7.18	8.81	2.27	7	1.52	6.37	3	C.Truck-1991-1995		
84067	13.58	4.94	6.24	5.47	4.15	1.73	1.76	1.86	3	C.Truck-1991-1995		
84073	16.58	7	5.68	7.41	6.07	2.98	0.88	3	3	C.Truck-1991-1995		
84094	13.04	4.81	9.56	5.55	1.5	2.06	1.38	1.98	3	C.Truck-1991-1995		
84119	26.99	19.43	20.97	19.93	-2.65	7.15	-0.83	6.1	3	C.Truck-1991-1995		
84125	9.38	6.63	5.5	6.69	2.43	3.6	1.39	3.39	3	C.Truck-1991-1995		
84132	16.64	4.16	11.33	5.31	15.01	3.55	6.19	4.33	3	C.Truck-1991-1995		
84137	17.68	5.58	45.02	8.93	5.94	4.53	1.83	4.41	3	C.Truck-1991-1995	FQ;3	DUPLICATE
84138	17.58	6.68	3.23	7.02	11.11	5.32	2.15	5.41	3	C.Truck-1991-1995		
84144	22.16	2.76	5.39	3.94	19.74	6.72	-0.42	6.9	3	C.Truck-1991-1995		
84196	1.02	0.72	0.38	0.72	1.15	3.94	64.29	8.01	3	C.Truck-1991-1995	FQPAD	Engine skipping on accel.
84206	8.54	3.84	1.8	3.95	2.9	1.22	1.32	1.31	3	C.Truck-1991-1995		
84268									3	C.Truck-1991-1995		
84281	27.26	9.12	0.64	9.48	9.02	10.35	3.61	9.81	3	C.Truck-1991-1995	VQ;2	
84287									3	C.Truck-1991-1995		
84302	9.44	12.42	8.48	11.99	6.95	7.04	6.47	7	3	C.Truck-1991-1995		
84315	97.26	32.56	65.02	38.05	105.61	56.09	86.42	60.67	3	C.Truck-1991-1995		
Average	18.92059	8.090588	11.89059	8.908235	11.83824	7.348235	11.38941	7.858235				
Std. Dev.	21.4384	7.63763	17.31145	8.628843	24.77363	12.8434	24.72355	13.85121				

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Comp	Bin No.	Assigned Bin	QC Code	Comment
84034	1.35	1.18	1.46	1.21	9.08	2.16	4.06	2.65	4	D.Truck-1996-Newer	FDP	
84035	2.44	2.34	0.45	2.22	6.14	6.25	0.82	5.86	4	D.Truck-1996-Newer		
84039	11.13	5.15	4.87	5.45	7.65	2.36	2	2.61	4	D.Truck-1996-Newer		
84055	10.95	8.45	11.39	8.78	4.9	4.62	7	4.8	4	D.Truck-1996-Newer		Rattling catalyst possibly bad
84056	2.45	2.26	0.44	2.15	2.11	1.42	0.34	1.39	4	D.Truck-1996-Newer		
84069	9.97	2.24	1.86	2.62	2.13	0.43	-0.03	0.49	4	D.Truck-1996-Newer		
84072	4.31	4.52	0.43	4.22	2.57	1.52	0.86	1.53	4	D.Truck-1996-Newer		Zero drift on torque readout
84086									4	D.Truck-1996-Newer	VQ;3	Traction control was engaged
84096									4	D.Truck-1996-Newer	VQ;2	
84098	4.31	0.67	1.03	0.89	2.88	0.31	1.35	0.51	4	D.Truck-1996-Newer		
84104	9.62	2.58	0.5	2.8	3.55	1.5	0.73	1.56	4	D.Truck-1996-Newer		
84109	10.68	1.94	3.38	2.49	3.17	1.03	-0.05	1.07	4	D.Truck-1996-Newer		DUPLICATE
84111	10.1	3.95	2.22	4.15	47.55	1.76	0.87	4.07	4	D.Truck-1996-Newer		
84116	12.82	3.45	3.88	3.96	2.96	1.77	1.1	1.79	4	D.Truck-1996-Newer		DUPLICATE
84122	9.49	1.75	0.55	2.07	5.05	1.65	0.66	1.76	4	D.Truck-1996-Newer		
84127									4	D.Truck-1996-Newer	VQ;2	
84140									4	D.Truck-1996-Newer		
84150									4	D.Truck-1996-Newer	VQ;2	
84153									4	D.Truck-1996-Newer	VQ;2	
84167	8.14	1.75	0.94	2.02	5.64	0.67	0.06	0.89	4	D.Truck-1996-Newer		
84179	7.54	7	6.24	6.98	2.04	1.84	2.42	1.89	4	D.Truck-1996-Newer		
84192	0.12	-0.14	0.24	-0.1	0.13	5.87	-0.17	5.17	4	D.Truck-1996-Newer		
84193	0.24	0.14	0.33	0.16	8.73	5.86	2.26	5.76	4	D.Truck-1996-Newer		
84204									4	D.Truck-1996-Newer	FQ;2 VQ;3	Dyno malfunction
84205	32.81	12.5	3.43	12.92	15.85	8.58	1.07	8.44	4	D.Truck-1996-Newer		
84223	6.8	1.82	3.09	2.17	5.5	0.77	-1.05	0.89	4	D.Truck-1996-Newer		
84229	14.9	13.31	2.21	12.62	4.15	7.05	2.63	6.59	4	D.Truck-1996-Newer		
84242	29.8	7.22	4.38	8.21	14.3	1.35	-0.52	1.9	4	D.Truck-1996-Newer		
84286	25.15	9.23	18.46	10.66	4.33	2.63	3.83	2.8	4	D.Truck-1996-Newer		
84298									4	D.Truck-1996-Newer	VQ;2	
84303	6.11	5.1	3.18	5.02	2.84	2.4	2.84	2.45	4	D.Truck-1996-Newer		
84310	23.94	5.31	1.25	6	13.14	5.84	0.92	5.88	4	D.Truck-1996-Newer		
84329									4	D.Truck-1996-Newer	VQ;2	
84337	4.46	4.38	2.46	4.25	0.09	0.38	-0.18	0.32	4	D.Truck-1996-Newer		
84339	18.86	6.75	6.75	7.39	7.43	3.45	1.97	3.56	4	D.Truck-1996-Newer		
84343	12.66	1.3	2.5	1.97	5.45	1.09	0.23	1.25	4	D.Truck-1996-Newer	FD;2,3,4?	
84344	58.85	5.98	6.67	8.83	15.16	2.36	-0.13	2.86	4	D.Truck-1996-Newer		
84349	14.14	4.89	3.87	5.31	2.8	0.83	-0.6	0.84	4	D.Truck-1996-Newer		
84375									4	D.Truck-1996-Newer	VQ;2	
84376	31.96	8.74	4.61	9.64	13.88	5.24	-0.07	5.3	4	D.Truck-1996-Newer		
Average	13.20333	4.525333	3.435667	4.902	7.373333	2.766333	1.174	2.896				
Std. Dev.	12.52145	3.450489	3.782561	3.597116	8.795765	2.274557	1.689566	2.148722				
84076	86.68	3.92	25.46	9.6	56.41	14.47	5.73	15.99	5	E.Car-Pre 1981		
84188	538.87	6.56	45.72	37.9	326.23	25.61	9.46	40.64	5	E.Car-Pre 1981		Stalled at start of Z1
84271	48.17	2.46	7.74	5.16	57.2	2.78	3.12	5.66	5	E.Car-Pre 1981		
84277									5	E.Car-Pre 1981	VQ;2	
84309	223.24	40.51	68.96	51.91	134.01	40.2	16.79	43.42	5	E.Car-Pre 1981		
84367	117.84	22.33	18	26.88	138	89.06	144.55	95.34	5	E.Car-Pre 1981		
Average	202.96	15.156	33.176	26.29	142.37	34.424	35.93	40.21				
Std. Dev.	198.7292	16.24514	24.36537	19.4715	110.155	33.52479	60.93817	34.74952				

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Comç	Bin No.	Assigned Bin	QC Code	Comment
84040	11.05	11.54	5.63	11.11	2.35	4.93	4.87	4.79	6	F.Car-1981-1990		
84052									6	F.Car-1981-1990	VQ;2	AC switch broken
84071	32.71	9.06	29.45	11.7	72.47	34.86	58.32	38.43	6	F.Car-1981-1990		
84079	40.1	2.04	0.18	3.86	286.41	19.69	6.22	32.43	6	F.Car-1981-1990	VD;2,4	
84107									6	F.Car-1981-1990	VQ;1,2	
84120	3.38	2.57	-0.46	2.41	2.92	5.8	3	5.47	6	F.Car-1981-1990		
84123									6	F.Car-1981-1990	VQ;2	DUPLICATE
84126	10.8	5.93	4.66	6.09	9.56	2.56	2.07	2.89	6	F.Car-1981-1990		
84141	17.96	3.32	2.7	4.02	14.43	11.38	3.61	11	6	F.Car-1981-1990	FPA;2,3,4	Torque not recorded
84159									8	H.Car-1996-Newer		DUPLICATE
84162	25.42	43.79	8.42	40.42	14.94	27.89	2.63	25.49	6	F.Car-1981-1990		
84171									6	F.Car-1981-1990	VQ;2	Stalled twice in Z2
84172	23.51	7.67	2.75	8.16	26.91	13.56	2.07	13.47	6	F.Car-1981-1990		
84175	26.77	2.26	6.86	3.86	20.35	2.88	0.64	3.64	6	F.Car-1981-1990		
84180	37.22	5.41	8.12	7.23	25.73	8.93	1.26	9.26	6	F.Car-1981-1990		
84197	10.52	2.99	2.96	3.38	3.46	0.7	1.29	0.89	6	F.Car-1981-1990		Hard cold start
84208	216.41	13.39	63.74	27.4	209.33	42.73	86.8	54.42	6	F.Car-1981-1990	FS	
84210	46.2	7.61	11.62	9.8	101.5	7.24	8.46	12.01	6	F.Car-1981-1990		
84211	12.21	6.22	2.8	6.3	14.04	34.89	7.12	31.9	6	F.Car-1981-1990		
84213									6	F.Car-1981-1990	VQ;2	
84221	51.8	12.57	12.01	14.57	27.45	10.99	2.55	11.26	6	F.Car-1981-1990		
84233	21.64	7.61	8.94	8.42	34.33	5.74	7.5	7.31	6	F.Car-1981-1990		
84235	41.06	43.22	29.01	42.12	29.48	44.96	8.74	41.64	6	F.Car-1981-1990		
84238	16.09	5.3	4.97	5.83	5.47	11.43	0.85	10.4	6	F.Car-1981-1990		Shut off twice during initial idle
84239									6	F.Car-1981-1990	VQ;2	
84245	10.45	79.87	28.37	72.69	5.57	54.38	6.22	48.49	6	F.Car-1981-1990		
84250									6	F.Car-1981-1990	FQ;2,3,4	
84257	21.91	9.25	12.76	10.15	-1.5	4.46	3.44	4.08	6	F.Car-1981-1990		
84261									6	F.Car-1981-1990	VQ;2	
84265									6	F.Car-1981-1990	VQ;2	
84267	22.82	6.38	8.31	7.36	9.36	3.26	2.51	3.52	6	F.Car-1981-1990		
84270	23.68	8.25	6.6	8.94	14.15	26.59	4.86	24.44	6	F.Car-1981-1990		
84276	20.79	5.15	2.63	5.79	13.36	1.26	1.18	1.89	6	F.Car-1981-1990		
84284	13.44	24.64	23.49	23.97	20.16	79.97	14.95	72.28	6	F.Car-1981-1990		
84289	55.73	293.03	193.28	274.02	51.6	181.75	15.14	163.67	6	F.Car-1981-1990		
84293									6	F.Car-1981-1990		Stalled in Z1
84295									6	F.Car-1981-1990	VQ;2	Stalled in Z1
84300	17.01	8.64	6.17	8.9	6.42	0.85	2.12	1.23	6	F.Car-1981-1990		
84301	23.07	13.54	19.44	14.43	12.58	9.86	4.96	9.66	6	F.Car-1981-1990	FQPAD	
84311									6	F.Car-1981-1990	VQ;2	
84314	15.15	11.14	10.08	11.27	11.32	3.44	1	3.68	6	F.Car-1981-1990		
84322	11.85	9.62	3.58	9.32	7.62	10.47	4.51	9.91	6	F.Car-1981-1990	FS	
84334	152.34	98.46	57.74	98.46	113.25	99	16.48	94.05	6	F.Car-1981-1990		
84335	14.89	3.09	3.18	3.73	6.58	5.71	0.9	5.42	6	F.Car-1981-1990	FD;2	
84366	10.21	21.57	10.02	20.17	4.42	7.61	0.33	6.94	6	F.Car-1981-1990		
84386	29.27	2.73	9.98	4.37	21.08	1.34	4.25	2.38	6	F.Car-1981-1990		would not go into gear for Z1
Average	32.95333	23.87455	18.18152	23.94697	36.27576	23.67	8.813636	23.28303				
Std. Dev.	41.83713	52.91356	34.72499	49.37687	61.40097	36.65589	17.3325	33.5535				

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Comp	Bin No.	Assigned Bin	QC Code	Comment
84036	5.27	2.86	2.36	2.95	6.42	1.6	0.55	1.78	7	G.Car-1991-1995		
84043	11.33	6.11	7.83	6.5	5.7	3.54	0.66	3.45	7	G.Car-1991-1995		
84091	10.76	-1.69	0.26	-0.91	1.34	0.93	1.21	0.97	7	G.Car-1991-1995		
84101	22.7	5.8	6.07	6.7	37.87	9.05	2.86	10.12	7	G.Car-1991-1995		
84108	11.64	-0.65	6.49	0.46	11.39	2.73	-0.4	2.96	7	G.Car-1991-1995	FA	
84110									7	G.Car-1991-1995	VQ;2	
84113									7	G.Car-1991-1995	VQ;2	
84115									7	G.Car-1991-1995	VQ;2	DUPLICATE
84135	24.18	-1.84	-0.69	-0.44	16.16	1.34	2.5	2.17	7	G.Car-1991-1995		
84148	47.1	14.45	19.74	16.52	51.67	47.56	25.42	46.24	7	G.Car-1991-1995		
84157									7	G.Car-1991-1995	VQ;4 VD;2,3,4	
84165	36.72	8.28	18.06	10.42	30.35	19.9	3.78	19.33	7	G.Car-1991-1995		
84166	6.9	-0.11	1.77	0.37	1.9	0.35	2.94	0.6	7	G.Car-1991-1995		
84169	9.45	4.49	4.26	4.72	0.49	0.12	-1.23	0.04	7	G.Car-1991-1995		DUPLICATE
84174	8.83	6.2	3.65	6.16	4.16	4.12	-0.98	3.76	7	G.Car-1991-1995		
84182	13.06	5.92	6.24	6.31	25.13	11.45	9.27	12	7	G.Car-1991-1995		
84198	19.87	1.54	-0.21	2.38	8.94	1.76	0.87	2.07	7	G.Car-1991-1995		
84200									7	G.Car-1991-1995	VQ;1,2 FS	DUPLICATE
84214	47.49	15.14	4.53	16.03	21.13	6.23	2	6.69	7	G.Car-1991-1995	FQ;1	Late crank, ~20 sec.
84215	-2.15	7.27	4.43	6.58	2.95	3.96	1.38	3.73	7	G.Car-1991-1995		
84219	11.43	5.11	14.46	6.07	7.58	9.34	0.73	8.66	7	G.Car-1991-1995	FQ;2	
84220	18.28	6.99	8.05	7.65	28.14	3.71	1.98	4.85	7	G.Car-1991-1995		
84228									7	G.Car-1991-1995	VQ;2	Stalled once
84230	8.96	4.7	0.38	4.62	7.5	3.07	2.18	3.24	7	G.Car-1991-1995		
84231	11.18	4.21	1.11	4.36	11.18	5.17	0.66	5.17	7	G.Car-1991-1995		
84234	7.73	4.78	6.05	5.02	4.06	1.45	2.78	1.67	7	G.Car-1991-1995		
84236	15.83	7.03	13.61	7.93	1.32	1.84	1.21	1.77	7	G.Car-1991-1995		
84244	19.41	22.51	17.42	22	7.93	24.55	1.17	22.08	7	G.Car-1991-1995		
84246	23.16	1.27	-0.13	2.3	38.13	23.68	9.76	23.46	7	G.Car-1991-1995		Cut off during first 10 sec. of Z1
84254	15.04	18.55	16.71	17.89	4.19	2.07	0.96	2.26	7	G.Car-1991-1995		
84258	12.61	6.45	-4.66	6.01	6.77	5.02	0.41	4.8	7	G.Car-1991-1995		
84262	30.06	8.19	15.12	9.8	7.16	3.27	1.04	3.32	7	G.Car-1991-1995		DUPLICATE
84274									7	G.Car-1991-1995	VQ;2	
84307	12.44	3.48	1.91	3.83	6.46	1.37	1.29	1.62	7	G.Car-1991-1995		
84308	19.4	7.67	8.93	8.36	6.73	3.93	1.65	3.91	7	G.Car-1991-1995		
84312	13.03	6.54	9.76	7.1	1.15	0.83	2.4	0.96	7	G.Car-1991-1995		DUPLICATE
84342	14.02	2.66	2.47	3.25	2.28	0.19	-0.29	0.27	7	G.Car-1991-1995		
84347									7	G.Car-1991-1995	VQ;2	
84353	11.79	8.86	0.83	8.45	9.41	5.46	3	5.49	7	G.Car-1991-1995	FS FTA	SPEED/TORQUE
84357	12.87	18.65	14.96	18.09	5.8	8.26	5.2	7.91	7	G.Car-1991-1995		
84359	11.25	13.15	7.45	12.66	4.97	5.67	-0.48	5.2	7	G.Car-1991-1995		
84365	14.45	7.18	3.8	7.32	3.64	3.5	2.77	3.46	7	G.Car-1991-1995		
84370	13.47	3.36	5.78	4.05	2.16	0.69	-1.43	0.62	7	G.Car-1991-1995		
84372	16.74	2.88	2.54	3.59	-1.59	0.38	-0.66	0.2	7	G.Car-1991-1995		
84380									7	G.Car-1991-1995	VQ;2	
84381	15.95	18.64	28.25	19.17	9.42	32.32	37.6	31.49	7	G.Car-1991-1995		
Average	16.27703	6.935946	7.015946	7.412703	10.81054	7.038108	3.371892	6.981622				
Std. Dev.	10.20265	5.888016	7.074836	5.705035	12.23035	10.12428	7.356661	9.751139				

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Com	Bin No.	Assigned Bin	QC Code	Comment
84032	0.87	0.62	0.82	0.65	15.65	1.59	5.81	2.58	8	H.Car-1996-Newer	FDP	
84042	17.2	2.86	1.15	3.46	15.18	1.78	4.47	2.63	8	H.Car-1996-Newer		Engine stalled several times
84047	7.58	1.25	0.17	1.51	9.48	1.07	3.06	1.64	8	H.Car-1996-Newer		
84050	3.53	3.05	1.81	2.99	1.58	1.51	0.37	1.43	8	H.Car-1996-Newer		Coolant on dyno after testing
84051	5.61	4.26	2.25	4.19	0.37	0.52	6.22	0.9	8	H.Car-1996-Newer		
84057	2.94	3.06	0.98	2.91	1.82	1.12	0.75	1.13	8	H.Car-1996-Newer		
84058	9.37	0.84	0.71	1.27	1.62	1.04	0.64	1.04	8	H.Car-1996-Newer		
84060	1.73	3.97	2.25	3.73	1.29	1.04	0.23	0.99	8	H.Car-1996-Newer		
84061	7.1	3.51	4.13	3.74	4.46	1.32	1.41	1.49	8	H.Car-1996-Newer		
84062	3.56	3.28	3.23	3.29	2.41	1.01	3.2	1.24	8	H.Car-1996-Newer		DUPLICATE
84063									8	H.Car-1996-Newer	VQ;2	
84068	3.09	3.28	0.13	3.05	2.51	0.2	0.19	0.32	8	H.Car-1996-Newer		
84077	5.08	2.42	1.39	2.49	2.63	0.73	0.7	0.82	8	H.Car-1996-Newer		Exhaust leaks
84078	3.78	3.97	1.4	3.79	-0.16	0.48	0.79	0.47	8	H.Car-1996-Newer		
84082	2.69	2.22	-0.19	2.08	3.52	0.69	2.93	0.98	8	H.Car-1996-Newer		
84083	4.9	2	0.12	2.02	4.02	0.59	0.56	0.77	8	H.Car-1996-Newer		
84084	3.66	1.71	-0.05	1.69	0.49	0.64	0.61	0.63	8	H.Car-1996-Newer		
84087	20.54	1.04	-0.24	1.96	11.09	1.27	0.31	1.71	8	H.Car-1996-Newer	FQ;2	
84088	4.14	1.84	1.67	1.94	1.81	1.17	1.43	1.22	8	H.Car-1996-Newer		
84090	4.84	0.48	1.55	0.78	4.06	0.48	-0.25	0.61	8	H.Car-1996-Newer		
84092	3.6	1.48	1.17	1.57	2.47	1.24	2.12	1.37	8	H.Car-1996-Newer		
84093	7.31	1.05	2.97	1.51	3.09	1.16	0.87	1.24	8	H.Car-1996-Newer		
84097	7.32	1	0.33	1.29	3.9	0.42	2.26	0.73	8	H.Car-1996-Newer		
84099	36.14	0.98	1.85	2.83	14.72	2.74	1.43	3.26	8	H.Car-1996-Newer		
84102	7.15	2.58	3.19	2.86	2.5	0.54	0.47	0.63	8	H.Car-1996-Newer		
84103	7.55	0.17	0.71	0.59	2.04	0.3	0.1	0.38	8	H.Car-1996-Newer		
84105	17.77	2.01	3.84	2.95	4.7	1.01	0.67	1.18	8	H.Car-1996-Newer		
84121	4.87	0.32	0.1	0.54	0.08	0.73	-0.21	0.63	8	H.Car-1996-Newer		
84128									8	H.Car-1996-Newer	VQ;2	
84129	9.77	1.83	0.52	2.15	10.09	2.18	0.07	2.45	8	H.Car-1996-Newer		
84131	5.57	2.57	0.81	2.6	1.68	2.3	0.21	2.13	8	H.Car-1996-Newer		
84133	6.84	0.96	-0.85	1.14	2.92	0.66	1.24	0.82	8	H.Car-1996-Newer		
84134	11.93	2.57	0.36	2.91	6.08	1.86	0.23	1.97	8	H.Car-1996-Newer		
84139	2.78	1.61	1.33	1.65	1.13			0.06	8	H.Car-1996-Newer		
84149	9.28	1.12	0.17	1.48	4.46	0.68	0.67	0.88	8	H.Car-1996-Newer		
84151									8	H.Car-1996-Newer	VQ;2	
84155									8	H.Car-1996-Newer	VQ;3 VD	
84156	22.72	0.99	1.49	2.16	7.75	1.66	2.25	2.02	7	G.Car-1991-1995		
84160									8	H.Car-1996-Newer	VQ;1,2,3,4	
84161									8	H.Car-1996-Newer	VQ;1 FQ;2	
84168	4.77	1.65	2.8	1.89	1.94	0.19	-1.22	0.19	8	H.Car-1996-Newer		
84173	19.73	0.71	2.07	1.79	16.6	0.72	-2.14	1.35	8	H.Car-1996-Newer		
84178	4.8	3.08	0.15	2.97	8.56	0.75	-0.19	1.09	8	H.Car-1996-Newer		
84183									8	H.Car-1996-Newer	VQ;2,4	
84184	10.32	8.37	-1.78	7.77	3.65	1.88	0.26	1.86	8	H.Car-1996-Newer		
84185	1.97	2.96	0.49	2.75	5.99	3.34	-0.17	3.24	8	H.Car-1996-Newer		
84191									8	H.Car-1996-Newer	VQ;3	

File No	QCM Bag1	QCM Bag2	QCM Bag3	QCM FTP	Grav Bag1	Grav Bag2	Grav Bag3	Grav Com	Bin No.	Assigned Bin	QC Code	Comment
84195	-0.45	-0.2	-0.38	-0.22	1.8	0.35	1.29	0.49	8	H.Car-1996-Newer		
84209	8.66	5.51	4.55	5.61	3.53	2.12	-1.93	1.92	8	H.Car-1996-Newer		
84224	5.73	3	2.4	3.1	0.93	0.42	-0.14	0.41	8	H.Car-1996-Newer		
84225	8.38	2.47	2.75	2.8	1.66	0.8	-0.78	0.74	8	H.Car-1996-Newer		
84227									8	H.Car-1996-Newer	FQPAD	
84240	10.42	2.87	3.09	3.28	2.78	1.55	4.24	1.8	8	H.Car-1996-Newer		
84241	13.35	7.46	4.62	7.57	6.91	0.97	-0.52	1.18	8	H.Car-1996-Newer		
84252	16.72	-0.32	0.34	0.62	8.12	0.41	-1.27	0.69	8	H.Car-1996-Newer	FA; PA	
84266	19.28	2.47	2.3	3.34	5.38	2.11	0.89	2.19	8	H.Car-1996-Newer		
84272	13.23	2.56	2.73	3.12	6.41	1.63	1.71	1.89	8	H.Car-1996-Newer		
84279	8.68	3.85	2.3	3.99	3.14	4.92	3.12	4.71	8	H.Car-1996-Newer	FD	Torque zero board dislodged Stalled 230 sec.into Z1
84280	6.87	2.96	1.97	3.09	2.91	0.87	1.09	1	8	H.Car-1996-Newer		
84285	14.86	3.84	1.71	4.26	6	1.85	-0.19	1.92	8	H.Car-1996-Newer		
84291	24.21	3.77	5.48	4.95	7.14	5.37	4.05	5.37	8	H.Car-1996-Newer	FQ;4 NAN?	
84292	150.41	14.95	13	21.83	61.62	9.12	1.43	11.31	8	H.Car-1996-Newer		
84296	12.81	1.14	-1.94	1.53	6.66	2.93	1.04	2.99	8	H.Car-1996-Newer		Stalled in Z1 ~200 sec.
84297	21.62	4.86	5.81	5.79	3.53	1.71	-0.2	1.68	8	H.Car-1996-Newer		
84304	6.27	5.36	2.78	5.22	2.77	2.16	0.49	2.07	8	H.Car-1996-Newer		
84305	6.03	3.79	3.5	3.89	1.6	1.25	0.59	1.22	8	H.Car-1996-Newer		
84316	21.62	21.31	22.79	21.43	52.54	51.07	27.77	49.53	8	H.Car-1996-Newer		Car smoking heavily at startup
84317									8	H.Car-1996-Newer	VQ;2	
84318									8	H.Car-1996-Newer	VQ;2	
84319	71.57	9.63	7.81	12.66	12.13	3.9	0.12	4.06	8	H.Car-1996-Newer		
84321	12.75	4.13	3.97	4.57	2.89	1.37	0.22	1.37	8	H.Car-1996-Newer		
84323	4.66	1.45	2.15	1.66	2.1	1.19	3.27	1.38	8	H.Car-1996-Newer		
84324	23.19	2.5	0.58	3.43	7.52	2.99	0.54	3.05	8	H.Car-1996-Newer		
84325	52.44	3.26	5.41	5.98	13.83	2.46	1.94	3.02	8	H.Car-1996-Newer		
84327	7.55	3.94	4.99	4.2	2.22	0.46	0.1	0.53	8	H.Car-1996-Newer		
84328	19.01	2.3	3.32	3.23	2.42	0.35	-0.67	0.39	8	H.Car-1996-Newer	DUPLICATE	
84330	17.57	0.66	1.22	1.57	9.05	1.18	-0.59	1.47	8	H.Car-1996-Newer		
84331	9.02	1.37	0.81	1.74	2.41	0.37	-0.01	0.45	8	H.Car-1996-Newer		
84332	18.8	5.35	3.66	5.92	3.29	2.37	-0.16	2.24	8	H.Car-1996-Newer		
84338	8.22	2.56	2.64	2.86	2.71	0.9	-1.16	0.85	8	H.Car-1996-Newer	DUPLICATE	
84341	23.91	4.63	3.56	5.57	17.96	2.49	65.53	7.65	8	H.Car-1996-Newer	DUPLICATE	
84345	13.47	2.44	3.16	3.06	0.17	0.39	-0.41	0.33	8	H.Car-1996-Newer		
84350	11.28	1.95	4.63	2.62	0.62	0.32	1.86	0.44	8	H.Car-1996-Newer	DUPLICATE	
84351									8	H.Car-1996-Newer	VQ;2	
84355	10.51	4.51	3.99	4.79	2.05	0.98	1.3	1.06	8	H.Car-1996-Newer	PAFA	
84356									8	H.Car-1996-Newer	VQ;2	
84361	6.53	0.59	2.58	1.04	0.54	0.49	0.38	0.49	8	H.Car-1996-Newer		
84362	8.96	2.38	5.18	2.92	0.88	0.07	-0.84	0.05	8	H.Car-1996-Newer		
84363	119.89	21.02	32	26.89	42.59	5.41	1.76	7.09	8	H.Car-1996-Newer		
84368	12.17	0.77	2.55	1.49	16.78	2.86	1.69	3.52	8	H.Car-1996-Newer	FDR	
84369									8	H.Car-1996-Newer	VQ;1,2	
84377	5.01	3.18	2.05	3.2	2.67	0.49	-3.04	0.36	8	H.Car-1996-Newer		
84379	11.02	4.08	6.54	4.6	2.39	1.51	1.97	1.59	8	H.Car-1996-Newer		
84382	11.88	3.16	2.9	3.58	1.29	1.02	1.66	1.08	8	H.Car-1996-Newer		
84383	12.17	2.46	4.01	3.08	1.82	0.79	1.34	0.88	8	H.Car-1996-Newer		
84384	53.51	5.79	8.23	8.48	16.71	3.06	-0.05	3.56	8	H.Car-1996-Newer		
Average	14.97793	3.285732	2.960244	3.869268	6.593293	2.119012	1.997284	2.318293				
Std. Dev.	22.45523	3.623911	4.573243	4.328042	10.13502	5.684796	7.908866	5.563265				